IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Snider et al.	)	Group Art Unit: 1723
Serial No.:	10/799,092	)	Examiner: Yoon Young Kim
Filed:	March 12, 2004	)	
For:	ACID REDUCING FILTER	)	

DECLARATION OF PRIOR INVENTION IN THE UNITED STATES TO OVERCOME CITED PATENT PUBLICATION (37 C.F.R. § 1.131)

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PURPOSE OF THIS DECLARATION

1. This declaration is to establish completion of the invention of this application in the United States at a date prior to September 22, 2003, that is the effective date of the prior art patent publication No. 2005/0061734 (the Tarrant publication), that was cited by the Examiner in an Office Action dated March 23, 2006.

2. The persons making this declaration are the inventors.

FACTS AND DOCUMENTARY EVIDENCE

3. To establish the date of completion of the invention of this application, the following attached documents are submitted as evidence.

   a. Disclosure document

   b. Southwest Research Institute Final Letter Report

   c. Drawing Part No. 16-29759

4. These documents are all dated prior to September 22, 2003, the effective date of the reference. From the disclosure (document a.), it can be seen that the conception was prior to the effective date of the Tarrant publication. From the Southwest Research Institute Final Letter Report (document b.), it can be seen that the invention of this application was successfully tested and reduced to practice prior to the effective date of the Tarrant publication. The Final Letter Report concluded that the full flow / bypass oil filter containing louvered zinc mesh (the invention in this application) provided improved soot-removal efficiency and extended oil-drain intervals. The drawing (document c) discloses the oil filter tested successfully in the Final Letter Report, which oil filter is identified in the Southwest Research Institute Final Letter Report on Page 4 as XE-4925 (w/zinc) and which corresponds to the invention of this application.

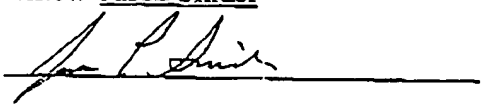
TIME OF PRESENTATION OF THE DECLARATION

This declaration is submitted prior to Final Rejection.

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

A. Inventors

Full name of first inventor: Jason Snider

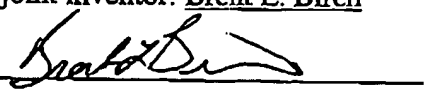
Inventor's signature 

Date 8-23-06 Country of Citizenship: USA

Residence: 1124 N. Walnut Street, Olney, Illinois 62450

Post Office Address: If different

Full name of second or joint inventor: Brent L. Birch

Inventor's signature 

Date 8-23-06 Country of Citizenship: USA

Residence: 3712 N. Cottage Hill Road, Olney, Illinois 62450

Post Office Address: If different

B. Assignee

Date: August 23, 2006

Assignee: Champion Laboratories, Inc.

230 E. Walnut Street

Albion, IL 62806

Mr. John D. Gaither

John D. Gaither
Vice President, Engineering

Assignment recorded in the Patent and Trademark Office on April 12, 2006 at Reel 015199, Frame 0585.

Jim Tredway

To: srothstein@olsonhierl.com
cc: John Gaither/IL/ChampLabs@ChampLabs, John Stockhowe/IL/ChampLabs@ChampLabs, Brent Birch/IL/ChampLabs@ChampLabs, Jason Snider/IL/ChampLabs@ChampLabs, Kevin Ankenbrand/IL/ChampLabs@ChampLabs, John Evans/IL/ChampLabs@ChampLabs
Subject: Patent Search

Sy :

Champion is planning on developing a line of lube filters that would include a zinc wrap around the traditional filter media.

The basic claim is that the zinc wrap would act sacrificially to neutralize corrosive products in the lube system.
This would also support the TBN, (Total Base Number), of the oil.

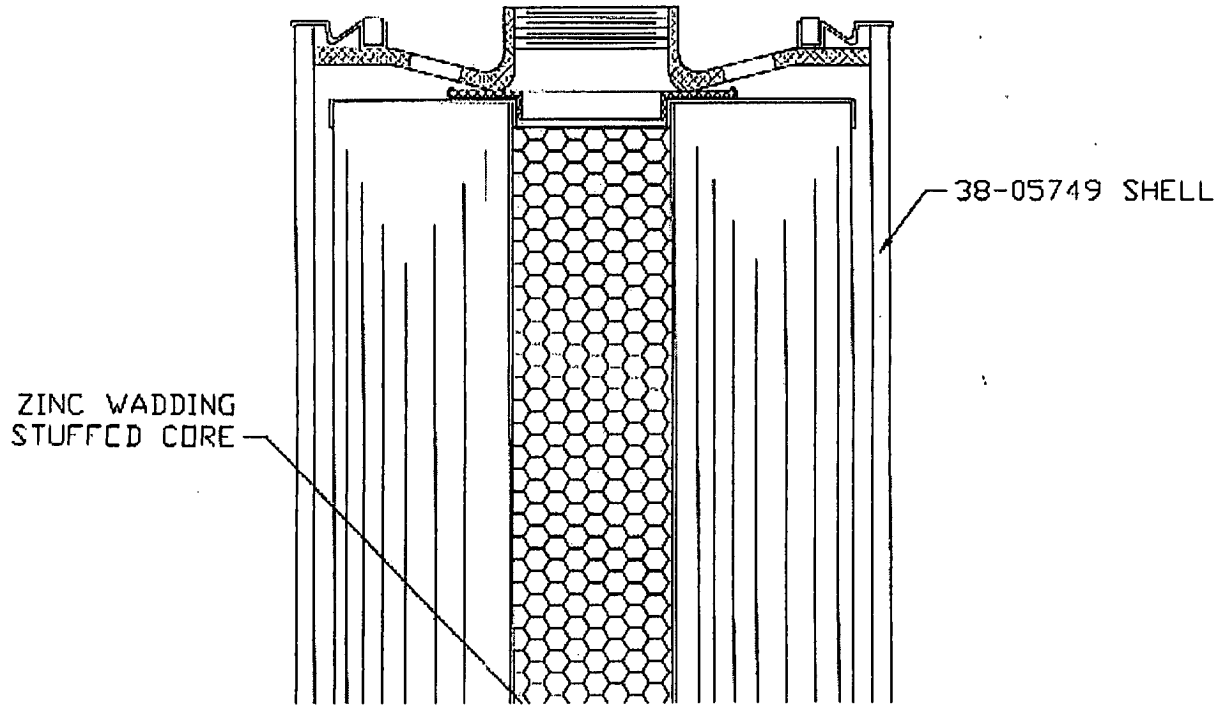
We also feel that this claim could be used for fuel and coolant filters applications. This might also be applicable for drinking water, swimming pool filters, or basically any type of filtration products that involves neutralizing and removing corrosive agents.

I am requesting a search to see if there are any existing patents that involve the use of zinc in this type of application. We want to be able to patent this type of product if possible.

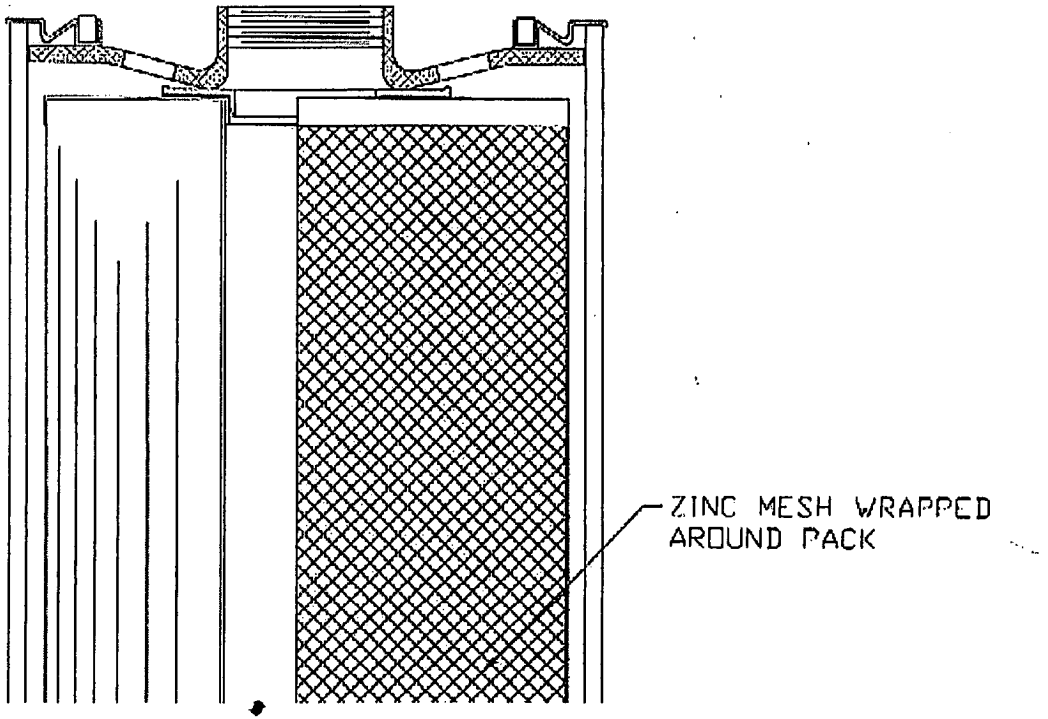
If you have questions concerning this request, please contact myself, John Gaither, Brent Birch, or John Stockhowe.
Any of us can be reached at 618-456-8831.

Jim Tredway
Product Engineer
Champion Laboratories

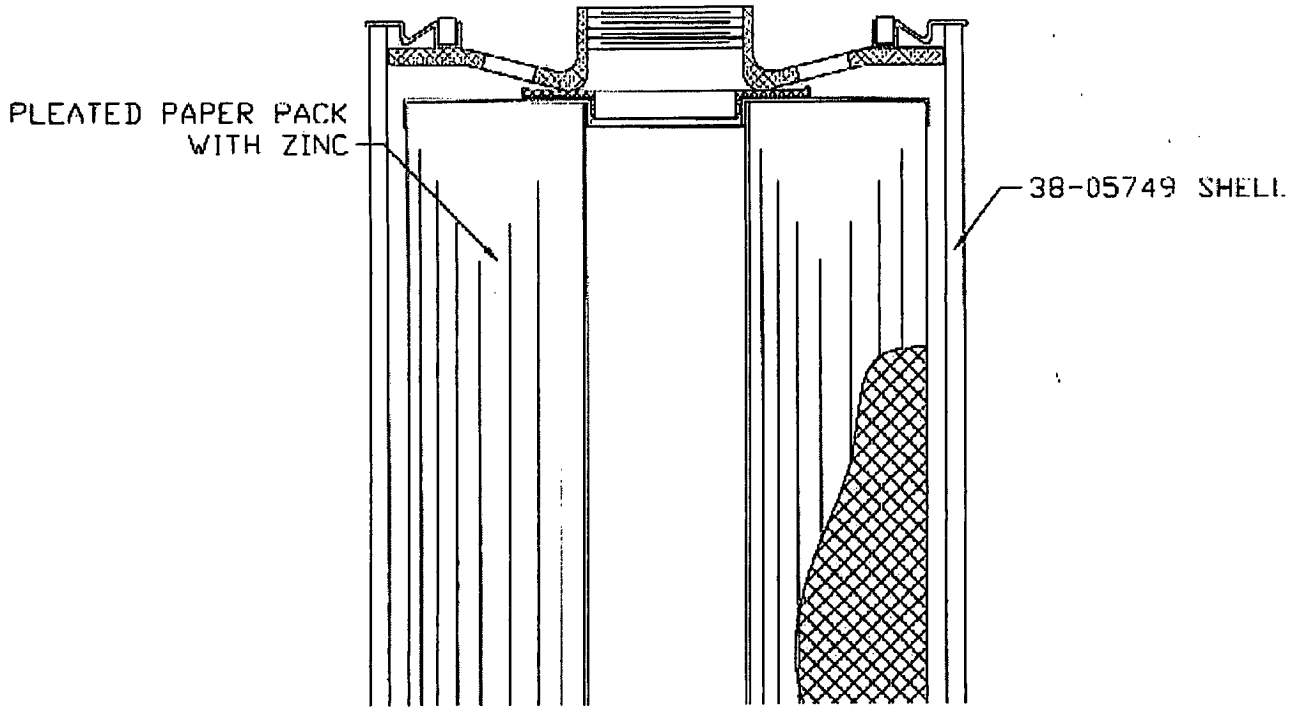
'PASS FILTER WITH ZINC WADDING PACKED IN CORE



YPASS FILTER WITH ZINC WRAPPED PACK



BYPASS FILTER WITH ZINC CO-PLEAT



SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA ROAD • POST OFFICE DRAWER 28510 • SAN ANTONIO, TEXAS, USA 78228-0510 • (210) 684-5111 • TELEX 244846

ENGINE AND VEHICLE RESEARCH DIVISION
U.S. ARMY TARDEC FUELS AND LUBRICANTS RESEARCH FACILITY (SWRI)

HTTP://ENGINEANDVEHICLE.SWRI.ORG

FAX No. 210/522-3270

ISO 9001 Certified
ISO 14001 Certified

Champion Laboratories, Inc.
Serial No.: 10/799,092
Our Case No.: CL-23008
Document B.

Champion Laboratories, Inc.
Attn: Mr. Brent Birch
315 N. West Street
West Salem, IL 62476-0307

Subject: Final Letter Report, entitled "Evaluation of the Effects of a Novel By-Pass Oil Filter's TBN Performance and Soot-Removal Efficiency"
Southwest Research Institute® (SwRI®) Project No. 03.40.40.06501

Dear Mr. Birch:

The subject final report is provided below for your review.

1. BACKGROUND

Because current and future diesel engines need exhaust gas recirculation (EGR) or other emissions-reduction, it appears that by-pass oil filters will be required to manage the increased soot content. Several filtration companies are attempting to add extra features to their by-pass oil filters to reduce the Total Base Number (TBN) depletion rate. Current methods to reduce TBN depletion include time-released capsules and limestone to react with generated acids.

A preliminary meeting was held at SwRI to determine the feasibility of a novel concept that would incorporate a depth media wound with louvered zinc mesh. In theory, the depth media will remove soot while the louvered zinc mesh reacts with engine-generated acids, thereby extending the life of the oil's additive package and drain intervals.

A test matrix was generated that incorporated a laboratory feasibility study, a test bench study, and a comparison between a full-flow filter and a full-flow/by-pass oil filter system.

2. SCOPE OF WORK

The scope of work for this program was to determine if:

- Louvered zinc metal will react with engine-generated acids to extend the life of the oil's additive package;
- A full-flow/by-pass filtration system will extend oil-drain intervals and remove soot.

3. DESCRIPTION OF WORK

The program was designed to provide data in a systematic approach to determine feasibility. The approach was broken into the following three phases:

- Laboratory beaker tests
- Flow bench tests
- System evaluations

3.1 Laboratory Beaker Tests

The first objective of the program was to determine the feasibility of the concept.

Two tests were performed to determine the effects of zinc for maintaining the Total Base Number (TBN). The operating conditions are provided below.

- Approximately 800 grams oil Chevron Delo 15w-40 CI-4 oil;
- Test Temperature, approximately 93°C;
- Zinc mass, approximately 20 grams;
- Test time, 50 hours;
- Samples obtained at approximately 0, 5.5, 20.5, 24.5, 29.5, 44.5, and 50 hours;
- Total Acid Number (TAN) ASTM D664 and Total Base Number (TBN) ASTM D4739 were performed on each sample;
- ICP was performed on the neat oil and both end-of-test samples;
- SEM was performed on the zinc mesh when applicable.

Each test had two beakers of oil: 1) neat oil without zinc, and 2) neat oil with zinc mesh (Figure 1).

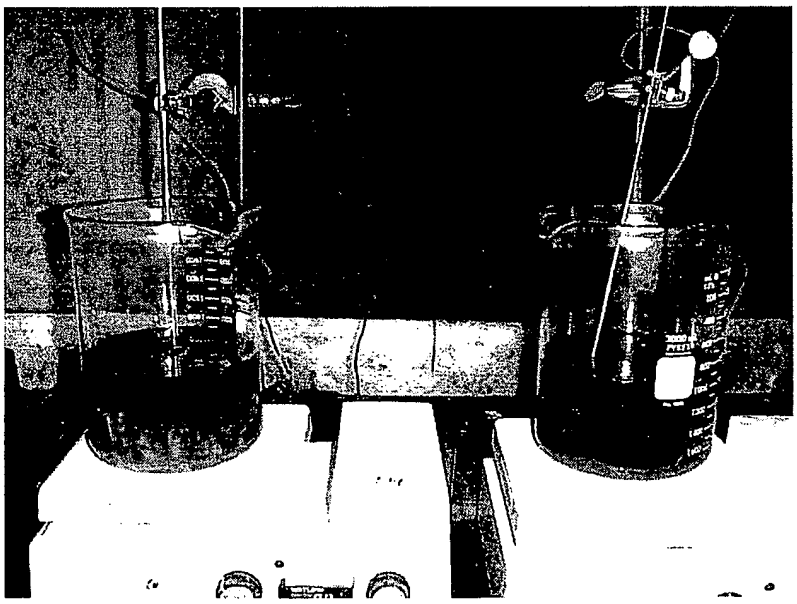


Figure 1. Laboratory Beaker Test

3.1.1 Test 1

An acid cocktail was produced that consisted of 80% 1N sulfuric acid, 10% 1N nitric acid and 10% 1N acetic acid. Literature has shown that these components are present in combustion by-products. A quantity of acid was determined to deplete the TBN within the test period. Over the 50-hour test period, 150 milliliters (mL) of the acid cocktail was dripped into the oil samples.

The TAN/TBN results are shown in Table 1. The ICP results are shown in Table 2.

Table 1. TAN/TBN Results of Test 1

Time, Hrs.	Acid Added (mL)	Oil without Zinc		Oil with Zinc	
		TAN	TBN	TAN	TBN
0	0	3.93	9.37	3.91	8.53
5.5	16.5	4.47	9.04	4.25	8.23
20.5	61.5	4.48	4.71	4.71	6.47
24.5	73.5	5.39	3.29	5.30	5.08
29.5	88.5	5.30	2.99	6.15	4.13
44.5	133.5	5.47	1.27	5.19	1.84
50	150	5.64	1.24	5.87	2.05

Table 2. ICP Results for Test 1

Element	Neat Oil, ppm	EOT w/ Zinc, ppm	EOT w/o zinc, ppm
Calcium	3552	3466	3451
Phosphorus	1520	1505	1498
Zinc	1568	2234	1543

The reaction of the acid and the zinc is shown in Figures 2 and 3. Figure 2 is the neat louvered zinc mesh. Figure 3 is the louvered zinc mesh after exposure to the acid cocktail for 50 hours.

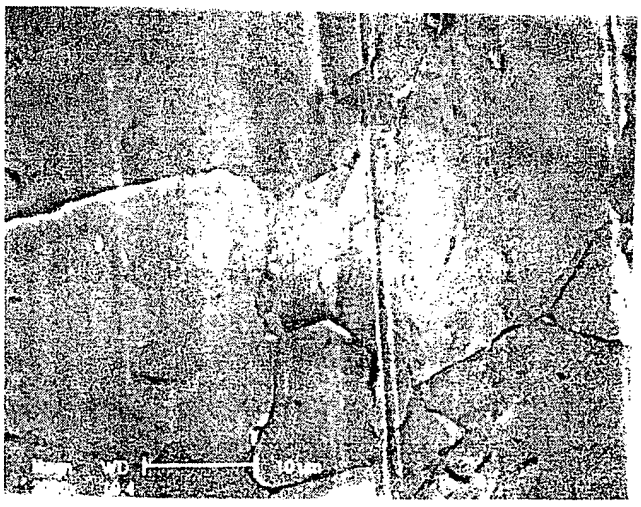


Figure 2. Neat Louvered Zinc Mesh

Figure 3. Louvered Zinc Mesh Exposed to Acid Cocktail

3.1.2 Test 2

Test 2 was performed just as Test 1, with the exception of the acid. A different acid cocktail was created that reduced the water content. However, the normality of the acid was greatly increased. The acid cocktail consisted of 28.75 g 36N sulfuric acid, 1.61 grams 15.8N nitric acid, and 1.80 grams 17.4N acetic acid. Five mL of this acid was added to each oil sample over the 50-hour test period. One mL was injected at 0, 5.5, 20.5, 29.5, and 44.5 hours.

The TAN/TBN results are shown in Table 3. The ICP results are shown in Table 4.

Table 3. TAN/TBN Results of Test 2

Time, Hrs.	Acid Added (mL)	Oil without Zinc		Oil with Zinc	
		TAN	TBN	TAN	TBN
0	0	4.31	8.00	3.73	9.78
5.5	16.5	4.25	5.56	4.57	7.90
20.5	61.5	4.44	5.31	5.26	5.27
24.5	73.5	5.26	2.66	4.91	2.26
29.5	88.5	4.81	1.63	5.39	1.29
44.5	133.5	--	0.47	--	--
50	150	--	--	--	--

Table 4. ICP Results for Test 2

Element	Neat Oil, ppm	EOT w/ Zinc, ppm	EOT w/o zinc, ppm
Calcium	3553	3507	3501
Phosphorus	1508	1355	1367
Zinc	1566	605	676

Although this test did not incorporate the water, it was not representative of any operating condition due to the high normality of the acid.

3.2 Flow Bench Tests

Based on the data from Tests 1 and 2, the 1N acid cocktail better suited the purposes of this experiment and was used in Test 3. The bench-top evaluations indicated that the zinc contributes to the life extension of the TBN. The next evaluation determined its effects with used oil.

Test 3 was performed per the proposed ISO bypass test method. Champion furnished two filters for evaluation: XE - 4925 (w/Zinc) and XE - 4926 (w/o Zinc).

The oil samples were analyzed and the data reduced. Figure 4 illustrates the repeatability of the two evaluations.

The efficiency for both evaluations is shown in Figure 5. The "with zinc" evaluation was terminated earlier than the "without zinc" evaluation due to decreased flow rate.

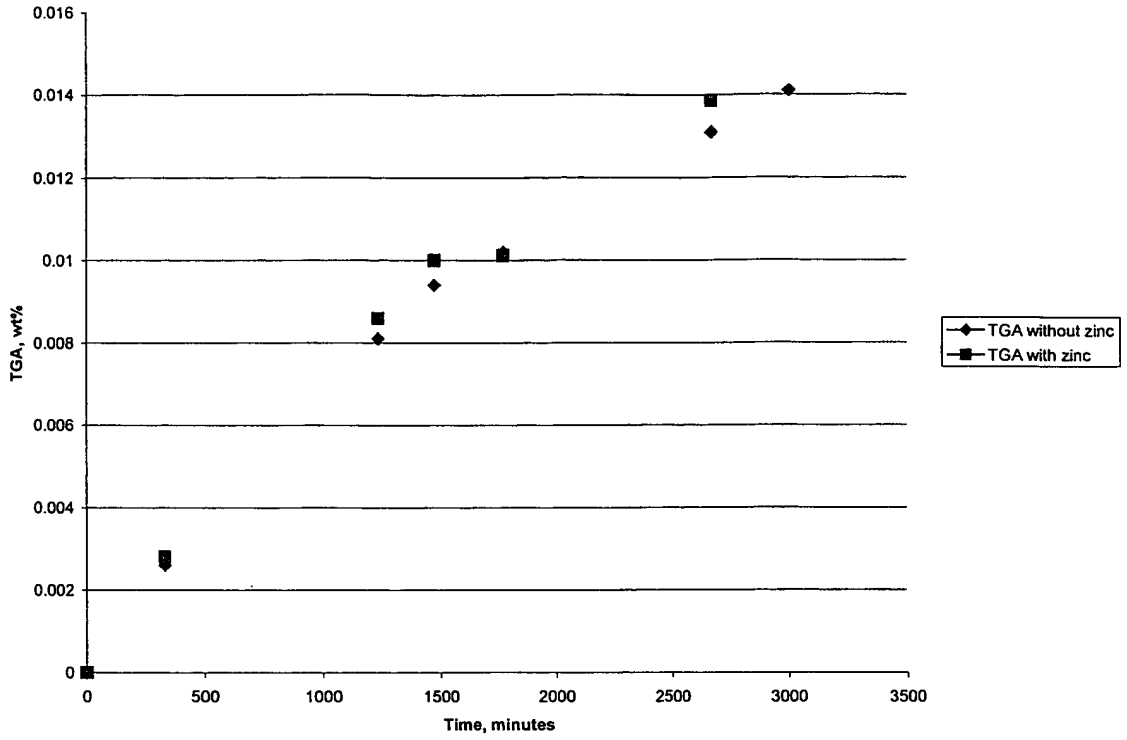


Figure 4. TGA Values for the Two Flow-Loop Evaluations

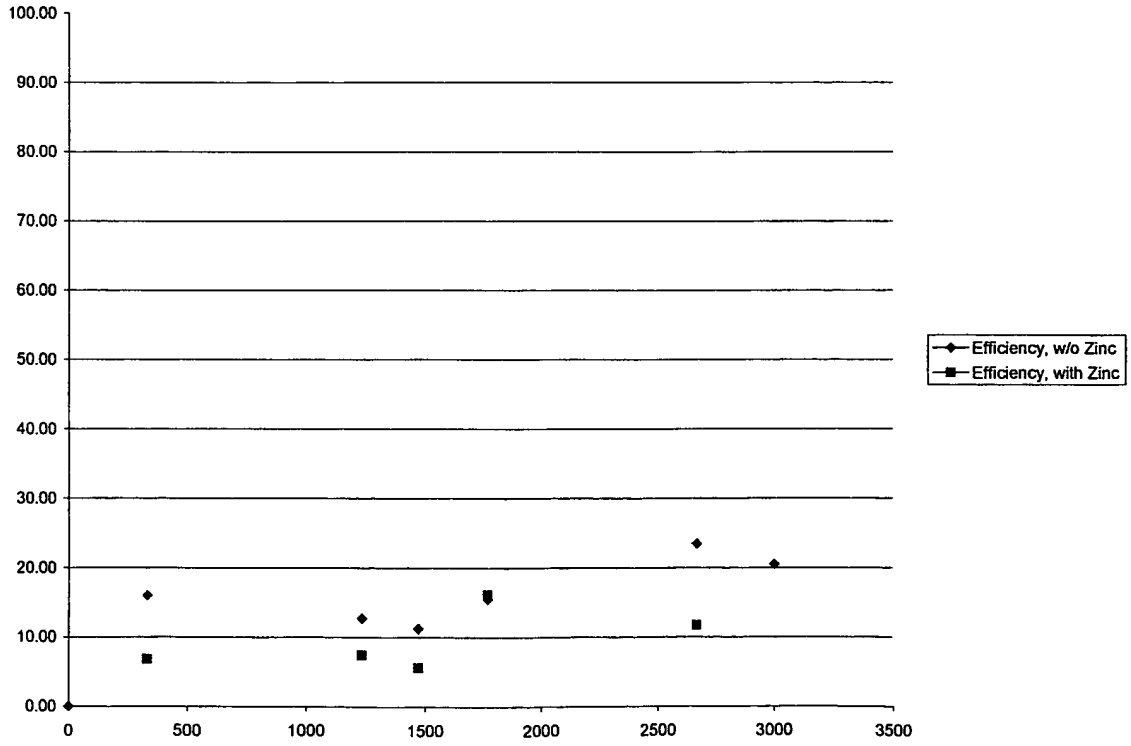


Figure 5. Efficiency for the Flow-Loop Evaluations

These results demonstrate that the soot-removal efficiencies for "with zinc" and "without zinc" bypass filters are relatively the same.

Figure 6 illustrates that the "with zinc" filters extended the oil drain interval. Using 2 as the industry minimum TBN, the "with zinc" increased the oil drain interval from 20 to 35 hours, or by approximately 75%.

3.3 System Evaluations

A full-flow and a full-flow with by-pass-filter test were completed to determine if the bypass filter contributed to soot removal. Both filtration systems were evaluated per modified ISO WD 23556. This new bypass test method evaluates soot-removal devices using engine-generated soot. The test method was modified because SwRI's use of used oil from M11 engine tests. The soot content was approximately 4.5 wt%. Figure 7 illustrates the improved soot-removal efficiency using the bypass filter in combination with the full-flow filter.

Figure 8 normalizes this data to present the improved efficiency using the bypass oil filter.

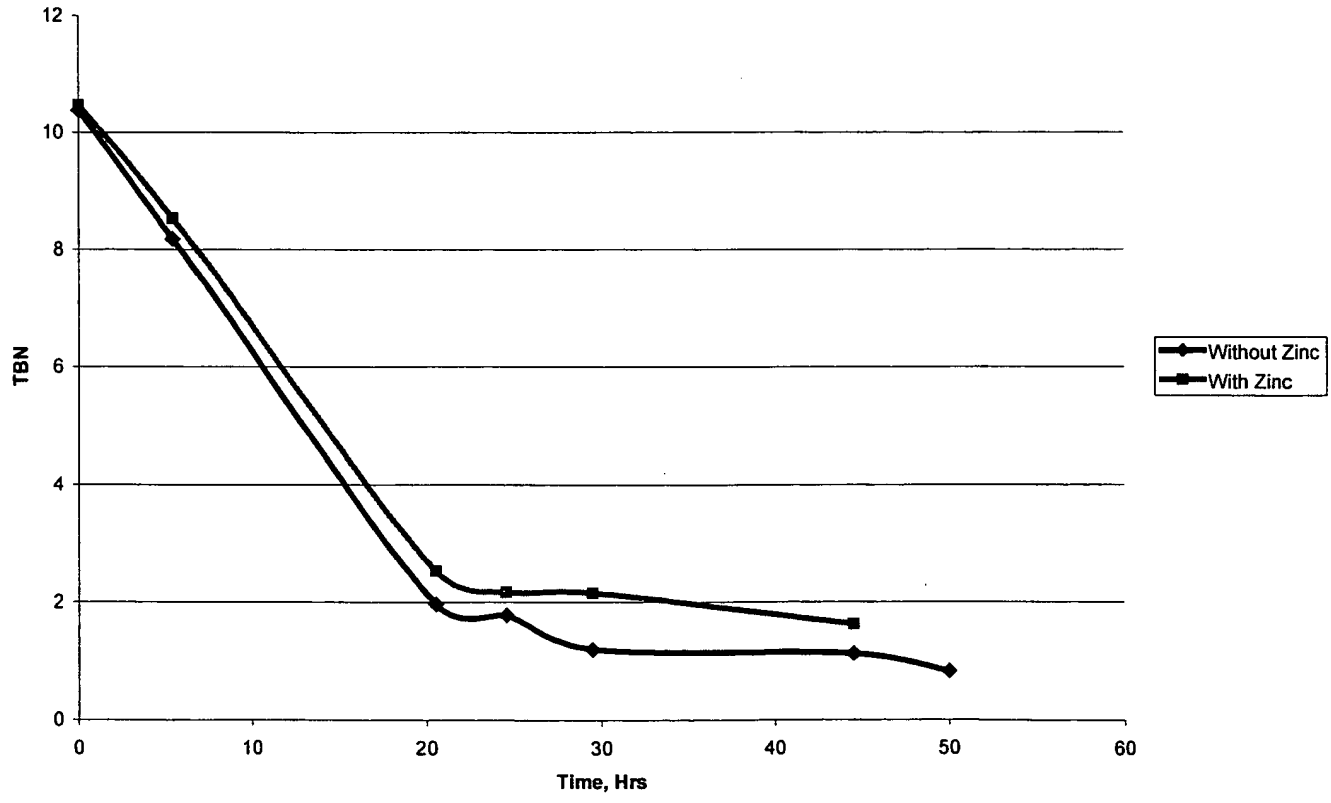


Figure 6. TBN Comparison

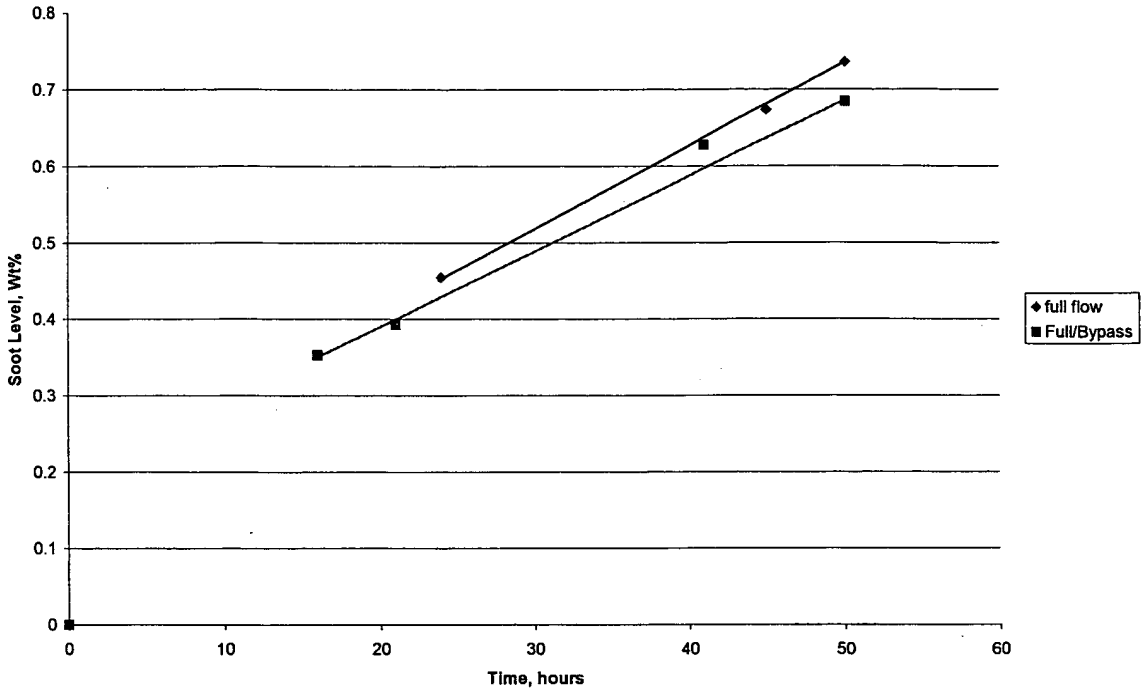


Figure 7. Filtration Systems Soot Removal

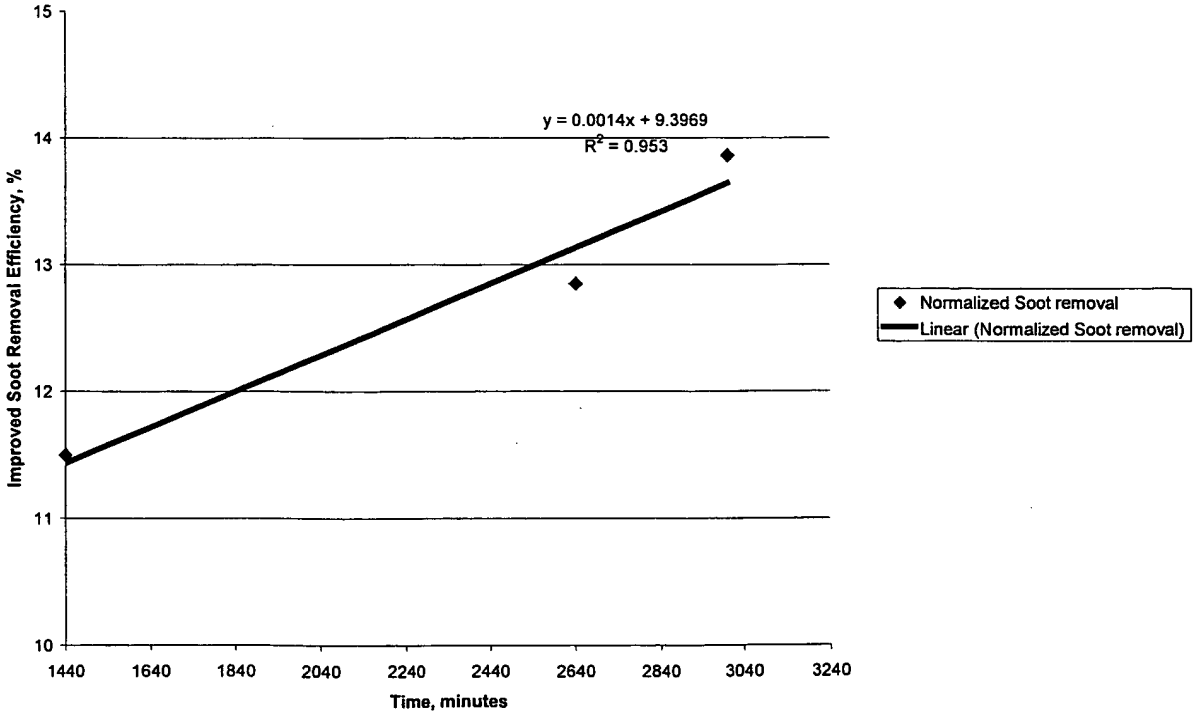


Figure 8. Normalized Soot-Removal Efficiency

4. CONCLUSIONS

A systematic approach was utilized to determine if bypass oil filter with louvered zinc mesh would improve the soot-removal efficiency and increase the drain interval by scavenging any engine-generated acid. This research demonstrated that the use of a full-flow/bypass oil filter containing louvered zinc mesh provides the following benefits:

- Improves soot-removal efficiency by approximately 10-14 %,
- Extends oil-drain interval by approximately 75%.

Thank you for the opportunity to perform this work. If you have any questions, please contact Gary Bessee at (210) 522-6941 or at gbessee@swri.org.

Approved:

Edwin C. Owens
Director
Fuels & Lubricants Technology Department

Sincerely,

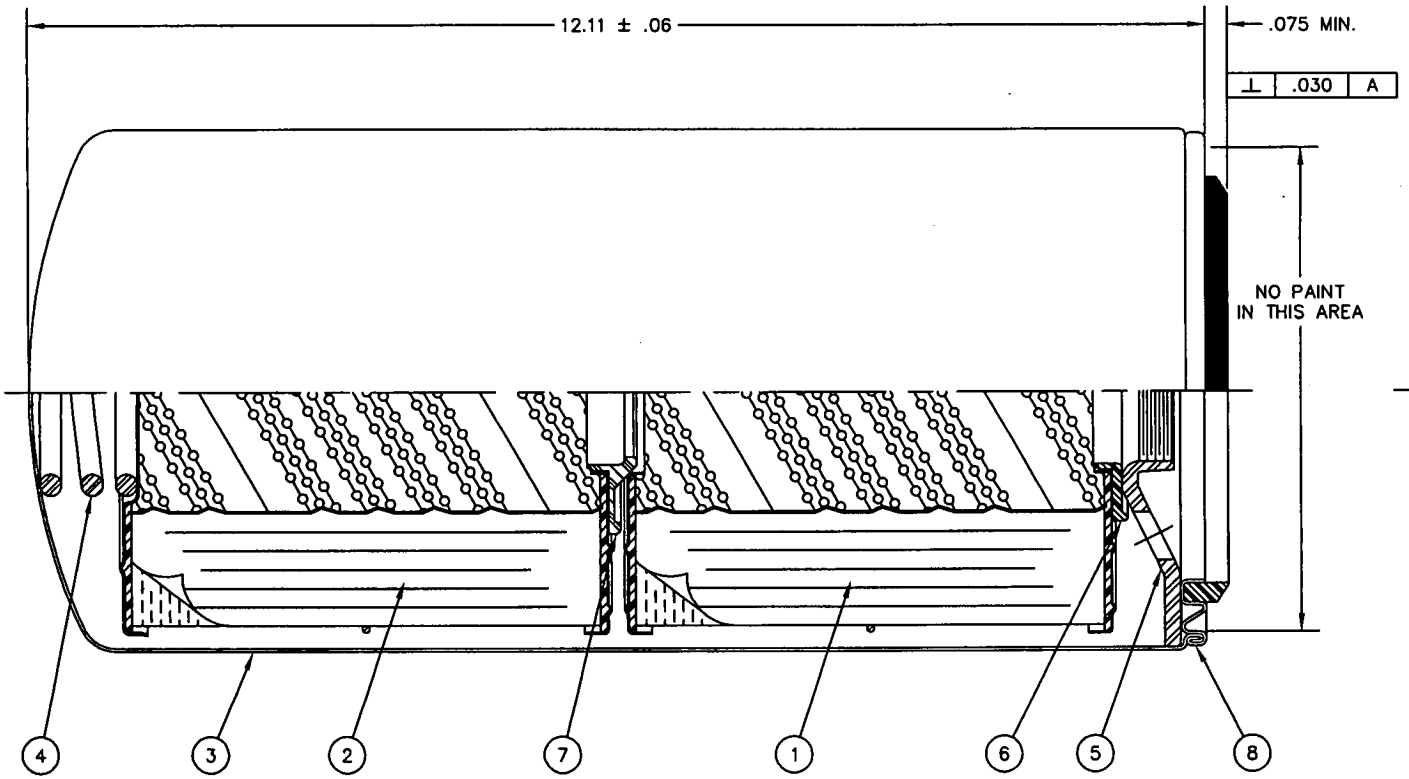
Gary B. Bessee
Manager
Filtration, Logistics, & Fluids Research

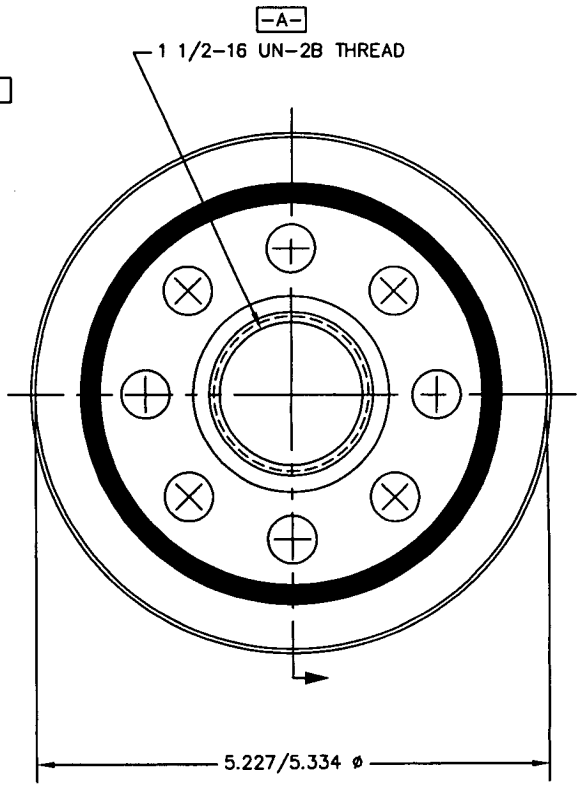
GBB/wcm

d:\workingfiles\reports\final\gbb\03-06501.doc

cc: Southwest Research Institute: L. Cura-Campos (03); S. Domine (Contracts), and B. Clark (03)

NO.	REVISION	BY	DATE	APP.	DATE





ITEM	PART NUMBER	DESCRIPTION	QTY.
8	108-14409	ROLL SEAM DETAIL	1
7	27-14457	GROMMET	1
6	27-28862	GROMMET	1
5	34-29280	LID ASSEMBLY	1
4	37-09013	SPRING	1
3	38-05794	SHELL	1
2	51-29758	ELEMENT ASSEMBLY	1
1	51-29774	ELEMENT ASSEMBLY	1

TOLERANCE UNLESS OTHERWISE SPECIFIED
DECIMALS: 2 PLACES ± .02 [0.5]
3 PLACES ± .010 [0.25]
ANGLES ± 1°

SYMBOLS
[000] METRIC ø DIAMETER ◎ CONCENTRIC ⟋ RUNOUT
▱ FLATNESS // PARALLEL ⊥ PERPENDICULAR
DO NOT SCALE DRAWING ANSI Y14.5

MATL

CHAMPION LABORATORIES, INC.

Luberfiner.

SCALE FULL

NAME: FILTER ASSEMBLY

CODE: M

PART NO.: 16-29759

REV.: 0

NOTES:
1. FILTER ASSEMBLY TO BE AIR TESTED AT 75 P.S.I. MIN.
2. INSTALLATION TORQUE: 1 TURN AFTER GASKET CONTACTS BASE.

Champion Laboratories, Inc.
Serial No.: 10/799,092
Our Case No.: CL-23008
Document C.